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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,655	02/05/2004	Yun Luo	TRW(TE)6894	6238

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EXAMINER	
FUJITA, KATRINA R	
ART UNIT	PAPER NUMBER
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/772,655	LUO ET AL.	
	Examiner	Art Unit	
	Katrina Fujita	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-28 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-28 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 02/05/2004,02/05/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it contains reference numerals from the drawings. Correction is required. See MPEP § 608.01(b).

Claim Suggestions

2. In claim 7, line 1, "modifies the grid pattern" should be changed to --is modified--.

Claim Objections

3. Claim 18 is objected to because of the following informalities:

In claim 18, line 2, "three-dimension" should be --three-dimensional--.

Appropriate correction is required.

4. The following is a quotation of 37 CFR 1.75(d)(1):

> The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

5. Claim 12 is objected to under 37 CFR 1.75(d)(1), as failing to conform to the invention as set forth in the remainder of the specification.

Claim 12 requires an image source to include a stereo camera. A stereo camera is a camera that contains two lenses and sensors within a single structure, which is not supported by the disclosure. However, when the claim is read in light of the specification, "stereo camera" should be "stereo camera system", as it is stated that "the cameras 70, 72 are charge-coupled devices ("CCD") or complementary metal-oxide semiconductor ("CMOS") devices" at page 7, line 7. Therefore, in line 2 of the claim, "a stereo camera **system**" will be assumed for examination purposes.

6. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

7. Claims 4, 6 and 26 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Claim 4 lacks antecedent basis for "the identified sub-image" at line 4. The following will be assumed for examination purposes: "the ~~identified~~ **selected** sub-image".

Claim 6 lacks antecedent basis for "the respective sub-images" at line 3. The following will be assumed for examination purposes: "~~the~~ respective sub-images".

Claim 26 lacks antecedent basis for "the modified grid" at line 3. The following will be assumed for examination purposes: "the modified grid **pattern**".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-4, 7, 9-17, 19-22 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko et al. (US 6,801,662), Chen et al. ("Improved distortion-invariant...", SPIE Article) and Samet ("The Quadtree and Related Hierarchical Data Structures", ACM Article).

Regarding **claims 1-4, 7, 13-14, 19-22 and 26**, Owechko discloses a system and method for selectively training data for a pattern recognition classifier associated with a vehicle occupant safety system from a plurality of training images representing an output class ("systems and methods for detection and classification of objects for use in control of vehicle systems, such as air bag deployment systems" at col. 1, line 8; "sensor fusion engine according to the present invention was trained with eleven-dimensional data collected from Hausdorff, edge, and motion classifiers" at col. 15, line 29) comprising

a vision system ("vision-based system" at col. 2, line 39) that images the interior of a vehicle to provide a plurality of training images ("For viewing the front portion of a vehicle occupancy area" at col. 7, line 60), and

a feature extractor (figure 1, numerals 110, 120, 130, 140) that extracts feature data as feature vectors from the plurality of training images ("The $\sigma^{(d)}$'s are also stored in a vector" at col. 6, line 60; "The edge densities of each cell in the edge density map are stacked as features...provided by a feature vector" at col. 9, line 28; "motion density map cell form the feature vector" at col. 10, line 40).

Owechko does not teach an image synthesizer that combines the plurality of training images into a class composite image and a grid generator that generates a grid pattern representing the output class from the class composite image.

Chen teaches an image synthesizer that combines the plurality of training images into a class composite image ("To keep the number of training images reasonable, it is feasible to integrate a group of similarly distorted images into a composite training image" at section 1, paragraph 2, line 5) which includes averaging grayscale values across corresponding pixels in the plurality of training images ("the average image of all training images in the i-th group" at section 2, paragraph 1, line 3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the training set of Owechko using the composite training image method taught by Chen as described above, to "detect and identify the presence or absence of interesting targets even when they are distorted" (Chen at section 1, paragraph 1, line 2).

The Owechko and Chen combination does not teach a grid generator that generates a grid pattern representing the output class from the class composite image.

Samet teaches a grid generator that generates a grid pattern (figure 1c; "the image array is successively subdivided into quadrants, subquadrants, etc. until homogeneous blocks are obtained" at section 2, paragraph 3, line 14) according to at least one attribute of interest ("in order to transform the data into a quadtree, a criterion must be chosen for deciding that an image is homogeneous...One such criterion is that the standard deviation of its gray levels is below a given threshold t" at section 2, paragraph 3, line 8).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the feature extraction modules of Owechko and Chen using the grid generation taught by Samet as described above, to "obtain a systematic way to represent homogeneous parts of an image" (Samet at section 2, paragraph 3, line 7).

Regarding **claims 9 and 10**, Owechko teaches a pattern recognition classifier that is training using the extracted feature data (figure 1, numerals 135, 145, 155) wherein the classifier includes at least one of a neural network and a support vector machine ("an NDA network is used to generate class confidences" at col. 10, line 57).

Regarding **claims 11 and 12**, Owechko teaches an image source that provides the plurality of training images wherein the image source includes a stereo camera system ("stereo imaging system" at col. 7, line 58; "Means for capturing images of an area may comprise CMOS or CCD cameras" at col. 3, line 10).

Regarding **claims 15 and 16**, Owechko teaches a plurality of training images including images of a human adult seated within the vehicle interior or images of a

rearward facing infant seat positioned within the vehicle interior ("adult in normal or twisted position, adult out-of-position (OOP), rear-facing infant seat (RFIS)," at col. 5, line 49).

Regarding **claim 17**, Owechko teaches a plurality of training images including images of a human head (figure 4).

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko, Chen and Samet as applied to claim 4 above, and further in view of Jiang et al. ("A New Method of Texture Segmentation", IEEE Article).

The Owechko, Chen and Samet combination teaches the elements of claim 4 as described in the 103 rejection above.

The Owechko, Chen and Samet combination does not teach selecting a maximum grayscale variance out of a plurality of grayscale variances associated with the respective sub-images.

Jiang in the same field of endeavor of feature extraction ("feature extraction methods" at section 3.1, paragraph 1, line 4) teaches selecting a maximum grayscale variance out of a plurality of grayscale variances associated with the respective sub-images ("subimage with the maximum variance in its subchannel is selected out as the initial feature" at section 2.2, paragraph 4, line 11).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the training set of Owechko, Chen and Samet using the sub-

image selection taught by Jiang as described above, to "keep the dimension of the feature stable" (Samet at section 2.10, paragraph 1, line 16).

11. Claims 8, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko, Chen and Samet as applied to claims 1 and 19 above, and further in view of Samet.

The Owechko, Chen and Samet combination teaches the elements of claims 1, 7 and 19 as described in the 103 rejections above.

The Owechko, Chen and Samet combination does not teach iteratively modifying a grid pattern until a grid pattern that divides the class composite image into a threshold number of sub-images has been.

Samet teaches a grid pattern that is iteratively modified until a grid pattern that divides the class composite image into a threshold number of sub-images has been generated ("resolution of the decomposition (i.e. the number of times that the decomposition process is applied) may be fixed" at section 1, paragraph 1, line 15).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the training set of Owechko, Chen and Samet using the grid modification taught by Samet as described above, to limit the amount of storage space needed as the "amount of space required is obviously a function of the resolution" (Samet at section 2.10, paragraph 1, line 16).

12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko, Chen and Samet as applied to claim 13 above, and further in view of Krumm (US 5,983,147).

The Owechko, Chen and Samet combination teaches the elements of claim 13 as described in the 103 rejection above.

The Owechko, Chen and Samet combination does not teach producing three-dimension image data of the vehicle interior as a stereo disparity map.

Krumm teaches producing three-dimension image data of the vehicle interior as a stereo disparity map ("disparity image--one that gives disparity values at every point in the image" at col. 6, line 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the vision system of Owechko, Chen and Samet using the disparity map taught by Krumm as described above, to provide "an invariant image for classification" (Krumm at col. 6, line 14) that eliminates the need to "compute range values" (Krumm at col. 6, lines 11-14).

13. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko, Chen and Samet as applied to claims 4 and 19 above, and further in view of Kaplan et al. ("Texture Segmentation using Multiscale Hurst Features", IEEE Article).

Regarding **claim 23**, the Owechko, Chen and Samet combination teaches the elements of claims 1,4 and 19 as described in the 103 rejections above. The

combination also teaches dividing an image or sub-image that based on a threshold value ("a criterion must be chosen for deciding that an image is homogeneous (i.e., uniform). One such criterion is that the standard deviation of its gray levels is below a given threshold t" at section 2, paragraph 3, line 10).

The Owechko, Chen and Samet combination does not teach a feature value including an average grayscale value.

Kaplan teaches a feature value including an average grayscale value ("mean feature is computed as the average grayscale" at section 4.1, paragraph 3, line 1).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the feature extractors of Owechko, Chen and Samet using the mean feature taught by Kaplan as described above, to provide another measure for consideration that would improve classification accuracy.

Regarding **claim 24**, the Owechko, Chen and Samet combination teaches the elements of claim 19 as described in the 103 rejection above.

The Owechko, Chen and Samet combination does not teach a feature value including a coarseness measure.

Kaplan teaches a feature value including a coarseness measure ("Hurst method provides roughness features" at section 4.1, paragraph 1, line 6).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the feature extractors of Owechko, Chen and Samet using the coarseness measure taught by Kaplan as described above, to provide features that are "invariant to image bias and contrast" (Kaplan at section 4.1, paragraph 1, line 7).

14. Claims 5 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Owechko, Chen, Samet and Kaplan as applied to claim 23 above, and further in view of Itoh et al. (US 4,769,850).

The Owechko, Chen, Samet and Kaplan combination teaches the elements of claim 23 as described in the 103 rejection above.

The Owechko, Chen, Samet and Kaplan combination does not teach the attribute of interest including a maximum average grayscale value.

Itoh discloses a system in the same field of endeavor of feature extraction ("The pattern recognition svstem according to the present invention is provided with means for calculating certain image-related feature values" at col. 1, line 63) teaches wherein a maximum feature value is extracted from feature data ("To examine the conditions for calculating the feature values S, the contents of the registers 30-j are transferred to a maximum value detector" at col. 5, line 66).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the feature extractors of Owechko, Chen, Samet and Samet using the maximum feature value extraction taught by Itoh as described above, to shorten processing time by further processing only the most likely sub-images.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2004/0153229, US 6,856,873 are both pertinent as teaching vehicle restraining systems containing training systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katrina Fujita whose telephone number is (571) 270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KF

Katrina Fujita
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SUPERVISORY PATENT EXAMINER